

CLAIMS

What is claimed is:

1. An apparatus for cleaning a surface within a vessel, the apparatus comprising:
an elongate combustion conduit extending from an upstream end to a downstream end associated with an aperture in a wall of the vessel and positioned to direct a shock wave toward said surface; and
a resilient member resiliently restraining the combustion conduit against recoil forces.
2. The apparatus of claim 1 wherein:
the resilient member couples the combustion conduit to the wall.
3. The apparatus of claim 1 wherein:
the resilient member comprises a metal coil spring.
4. The apparatus of claim 1 wherein:
the resilient member comprises a tension spring.
5. The apparatus of claim 1 further comprising:
a plurality of movable supports supporting weight of the combustion conduit at a plurality of locations along a length of the combustion conduit.
6. The apparatus of claim 5 wherein:
the plurality of supports accommodate longitudinal expansion and/or contraction of the combustion conduit.
7. The apparatus of claim 5 wherein:
the plurality of supports comprise a plurality of trolleys each having wheels engaging a track on a support surface.
8. The apparatus of claim 7 wherein:
the combustion conduit comprises a plurality of separable segments; and
each of the segments is supported atop a single associated one of the plurality of trolleys.

9. The apparatus of claim 5 wherein:
the plurality of supports comprise a plurality of hangers.
10. A method for cleaning a surface within a vessel of a piece of industrial equipment, the vessel having a wall with an aperture therein, the method comprising:
introducing fuel and oxidizer to a conduit; and
initiating a reaction of the fuel and oxidizer so as to cause a shock wave to impinge upon the surface, a recoil force upon the conduit being resiliently taken up by a resilient member.
11. The method of claim 10 wherein:
the resilient member stores energy of the recoil as the conduit shifts from an initial position to a recoiled position and then returns the conduit to the initial position.
12. The method of claim 11 wherein:
the shift is at least 0.01 m.
13. The method of claim 10 further comprising:
shifting the conduit as a unit along a support mechanism to disengage a downstream end of the conduit from the vessel.